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COOK, ALEX, McFARRON, MANZO,  
CUMMINGS & MEHLER, LTD.  
SUITE 2850  
200 WEST ADAMS STREET  
CHICAGO, IL 60606

EXAMINER
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YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/941,048

Applicant(s)

NISHI ET AL.

Examiner

Marie R. Yamnitzky

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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1. This Office action is in response to applicant's amendment received August 01, 2005, which amends claims 1, 3, 5, 7, 9 and 11, and adds claims 13-18.

Claims 1-18 are pending.

2. Claims 13-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

While the original disclosure describes a device comprising a metal complex which is PtOEP or Ir(ppy)<sub>3</sub>, the original disclosure does not describe a device in which the metal complex comprises PtOEP and Ir(ppy)<sub>3</sub>.

3. Claims 13-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not enable one skilled in the art to make and use the claimed device in which a metal complex comprises both PtOEP and Ir(ppy)<sub>3</sub>.

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4. Claims 13-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The use of the terms "comprises" and "and" in line 2 of each of claims 13-18 is confusing. PtOEP and Ir(ppy)<sub>3</sub> are two distinct metal complexes. It is not clear how a single metal complex could comprise both PtOEP and Ir(ppy)<sub>3</sub>. It is not clear if "and" should be interpreted as --or--. The use of the term "comprises" is also confusing because it is not clear what the metal complex could comprise in addition to PtOEP or Ir(ppy)<sub>3</sub>. It is not clear if the term "comprises" provides for substituted derivatives of PtOEP and substituted derivatives of Ir(ppy)<sub>3</sub>.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Brien et al. in *Appl. Phys. Lett.* Vol. 74, No. 3, pp. 442-444 or Baldo et al. in *Appl. Phys. Lett.* Vol. 75, No. 1, pp. 4-6, either reference in view of Salbeck et al. in *Synthetic Metals* 91, pp. 209-215.

O'Brien et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of  $\alpha$ -NPD and the luminescent layer is made of CBP as a host material and PTOEP as a phosphorescent dopant. The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole O'Brien article.

Baldo et al. disclose an organic electroluminescent device comprising a hole transport layer and an organic luminescent layer in which the hole transport layer is made of  $\alpha$ -NPD and the luminescent layer is made of CBP as a host material and Ir(ppy)<sub>3</sub> as a phosphorescent dopant. The luminescent layer is capable of converting triplet excitation energy into light to be emitted. See the whole Baldo article.

Neither O'Brien et al. nor Baldo et al. disclose spiro-CBP (the host material required by claims 1-4, 13 and 14) or spiro-NPD (the material required for the hole transport layer of claims 3, 4 and 14).

Salbeck et al. teach that by using a spiro-linkage to modify low molecular organic compounds, processability and morphologic stability can be increased while retaining the electronic properties of the compounds (e.g. see the abstract). Given the teachings of Salbeck et al., it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize spiro-CBP in place of CBP in O'Brien's or Baldo's device, and/or to utilize spiro-NPD in place of NPD in O'Brien's or Baldo's device, in order to increase the thermal stability of the devices. One of ordinary skill in the art at the time of the invention, having knowledge of the teachings of Salbeck et al., would have reasonably expected spiro-CBP and spiro-NPD to have

the same electronic properties as CBP and NPD, respectively, while having better thermal stability than the non-spiro compounds. From Salbeck's teachings such as in the first paragraph of the introduction, and from knowledge in the art, one of ordinary skill in the art at the time of the invention would have recognized the value of using compounds of improved thermal stability in the manufacture of organic electroluminescent devices.

Presuming "and" as recited in line 2 of claims 13 and 14 should read --or--, O'Brien et al. in view of Salbeck et al. render claims 13 and 14 unpatentable wherein the metal complex is PtOEP since O'Brien et al. disclose this metal complex as a phosphorescent dopant, and Baldo et al. in view of Salbeck et al. render claims 13 and 14 unpatentable wherein the metal complex is Ir(ppy)<sub>3</sub> since Baldo et al. disclose this metal complex as a phosphorescent dopant.

7. Claims 5-12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grushin et al. (US 2002/0121638 A1) in view of Salbeck et al. in *Synthetic Metals* 91, pp. 209-215.

See Grushin's whole published patent application. In particular, see paragraphs [0004], [0063]-[0071] and [0076], and see claim 13.

Grushin et al. disclose and claim a device comprising an emitting layer comprising an iridium compound that is capable of converting triplet excitation energy into light to be emitted, the device further comprising an electron transporting layer made from a compound of the first formula shown in present claim 5 ("TAZ") or a compound of the first formula shown in present claim 7 ("PBD"). The electron transporting layer made of either of these two compounds inherently functions as a hole blocking layer.

Grushin et al. teach that 4,4'-N,N'-dicarbazole biphenyl (CBP) may be used in combination with the iridium compound in the emitting layer.

Grushin et al. do not disclose spiro-CBP (the host material required by claims 5-12 and 15-18), spiro-TAZ (a material for the hole blocking layer as defined by the formula set forth in claim 9, with claims 10 and 17 dependent therefrom) or spiro-PBD (a material for the hole blocking layer as defined by the formula set forth in claim 11, with claims 12 and 18 dependent therefrom).

Salbeck et al. teach that by using a spiro-linkage to modify low molecular organic compounds, processability and morphologic stability can be increased while retaining the electronic properties of the compounds (e.g. see the abstract). Given the teachings of Salbeck et al., it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize spiro-CBP in place of CBP, and/or to utilize spiro-TAZ in place of TAZ, and/or to utilize spiro-PBD in place of PBD in Grushin's devices in order to increase the thermal stability of the devices. One of ordinary skill in the art at the time of the invention, having knowledge of the teachings of Salbeck et al., would have reasonably expected spiro-CBP, spiro-TAZ and spiro-PBD to have the same electronic properties as CBP, TAZ and PBD, respectively, while having better thermal stability than the non-spiro compounds. From Salbeck's teachings such as in the first paragraph of the introduction, and from knowledge in the art, one of ordinary skill in the art at the time of the invention would have recognized the value of using compounds of improved thermal stability in the manufacture of organic electroluminescent devices.

With respect to claims 15-18, if “and” as recited in line 2 of these claims should read --or--, and if “comprises” provides for substituted derivatives of PtOEP and Ir(ppy)<sub>3</sub>, then Grushin et al. in view of Salbeck et al. render claims 15-18 unpatentable wherein the metal complex comprises Ir(ppy)<sub>3</sub> since Grushin et al. disclose substituted derivatives of Ir(ppy)<sub>3</sub> for use in the emitting layer.

8. Applicant’s arguments filed August 01, 2005 have been fully considered but they are not persuasive.

The requirement that the luminescent material comprise a metal complex does not patentably distinguish the claimed device over the prior art devices because each of the three primary references discloses luminescent materials which comprise a metal complex.

Some of the claims previously did not require the organic luminescent layer to comprise spiro-CBP as a host material. All of the present claims require spiro-CBP as a host material in the organic luminescent layer. Applicant argues that when CBP (not spiro) is used as a host material, a problem exists in that excitation energy is shifted more widely. Applicant argues that the use of spiro-CBP as a host material “can suppress morphology while keeping excitation energy.”

By “suppress morphology”, the examiner presumes that applicant is referring to suppression of changes in morphology. Based on the teachings of Salbeck et al., one of ordinary skill in the art at the time of the invention would have reasonably expected that the spiro



compounds would be better at suppressing changes in morphology than the corresponding non-spiro compounds.

With respect to applicant's arguments regarding excitation energy, applicant has not pointed to any evidence of record demonstrating differences in excitation energy of CBP versus spiro-CBP. The examiner does not find any explicit teachings in the application as originally filed that spiro-CBP provides advantages over CBP with respect to excitation energy.

Even if spiro-CBP provides advantages over CBP with respect to excitation energy, the examiner maintains the position that one of ordinary skill in the art at the time of the invention, having knowledge of the teachings of Salbeck et al., would have been motivated to utilize spiro-CBP instead of CBP for the advantages that Salbeck et al. teach can be achieved by using a spiro-linked compound instead of the corresponding compound that is not spiro-linked.

9. Miscellaneous:

In line 2 of each of claims 13-18, "porphyrin" should read --porphyrin--.

In line 10 of claim 3, "expressed" should read --expressed--. This spelling error was introduced by applicant's amendment received January 18, 2005, and was noted in the Office action mailed April 05, 2005.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY  
October 17, 2005



**MARIE YAMNITZKY  
PRIMARY EXAMINER**

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